NEWS RELEASE

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Address by
James E. Webb, Administrator
National Aeronautics and Space Administration
before the
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"Our National Program in Space"

Before the end of the decade, the United States plans to land a team of scientists and astronauts on the moon, to explore it, to take measurements, and to bring samples back to earth.

A great deal of work here on earth and out in space must go on in the intervening years. First of all, those aspects of the study of the space environment,which can be most effectively and efficiently carried out here on earth, will occupy some of our best brains in our best laboratories. The spaceflight system, made up of the Mercury one-man space ship and the Atlas booster, will provide experimental proof of the forces at work both on an astronaut and his space ship as he performs his duties in orbit around the earth.

In the years just ahead, we will use the Mercury system for extensive research and development in manned space flight and for many scientific projects. However, there is a definite limit to what can be accomplished with a one-man space-flight system.

In addition to our work with Mercury, an active program of instrumented flights, outward to the moon, to land equipment on the moon, to take television pictures of its surface and to radio back information and data on which a manned landing can be undertaken, will go forward at an accelerated pace.

While the Mercury-Atlas space-flight system can carry only one man, the follow-on Apollo-Saturn or Apollo-Nova space-flight systems will be able to carry three men.

The success of this gigantic enterprise will depend upon the resources and initiative of a large part of our national technological-industrial complex. It will make special demands on the American chemical industry.

Rockets that burn chemical products will propel the lunar spacecraft. The air the crew breathes will be recycled and purified by chemical processes. The men, instruments, and life-support equipment on board will make use of electric power collected or generated and stored by fuel cells and other chemical means.

The Apollo spacecraft will incorporate materials developed, in part, through research and engineering in the chemical field. And on the return trip, layers of plastics and other materials produced by your industries will protect the exterior and insulate the interior, and thus the astronauts, from the searing heat of Apollo's meteor-like entry into the atmosphere.

Already a major, highly successful stride has been taken toward the rocket power needed for our Apollo lunar goal. On October 27, we launched from Cape Canaveral the initial test version of the first stage of the immense Saturn booster. Many of you may have seen it on television.

Of the 460-ton weight of the Saturn launch vehicle -- consisting of the first stage booster, plus two water-filled upper stages -- towering 10 feet taller than the Statue of Liberty -- 300 tons were made up of kerosene and liquid oxygen. Four seconds after the propellant was ignited, the eight rocket engines of the booster generated 1,300,000 pounds of thrust for the blast-off -- or some 28,000,000 horsepower. In less than two minutes, all 300 tons were pumped through the eight engines.

Electronic equipment radioed back quantities of information throughout the Saturn's eight minutes of flight. It reached an altitude of 85 miles, a peak speed of 3,590 miles per hour, and it came down in the Atlantic 215 miles downrange.

The Saturn booster has been under development for more than three years, having been started by the Department of Defense and transferred to the National Aeronautics and Space Administration in 1959. This illustrates that many of the activities now grouped in the National Aeronautics and Space Administration and forming the basis for the expanded lunar and space exploration program, have been under way for some time. The budget of the Space Agency, as recommended by President Eisenhower for the current year, amounted to $1,200,000,000.

Last spring, the President and Congress jointly established the goal of manned lunar exploration as a major part of an intensive effort to accelerate the development of space science and technology on as broad a basis and as rapidly as possible. In his State of the Union Message of May 25, President Kennedy stated that it was time for a "great new American enterprise." He recommended a national dedication to the goal of United States leadership in space. The President outlined a selective program to achieve the goal but emphasized that the decision should be made by Congress.

These recommendations Congress endorsed by appropriating $1,671,750,000 for NASA's Fiscal Year 1962 activities, enough money for the first steps in the speed-up. I think it is important to recognize that President Kennedy presented the program and Congress handled it on a bipartisan, or nonpartisan basis.

The budget provided funds to shorten the lead times in developing large rocket engines and space vehicles; for speeding exploration of areas near the earth and the moon, and the space between; to expedite the Rover nuclear rocket engine; and to press forward toward operational weather and communications satellite systems.

NASA's 1962 program is approximately twice the size of that for 1961.

Here I would like to emphasize that 80 cents out of every NASA dollar is spent with industry and private organizations, for materials, supplies, salaries, research, development, and many other services. These expenditures not only assure for the United States a leading role in space, but the utilization and preservation of the great national resource represented by our aerospace and other defense-supporting industries.

This dynamic new venture into space promises to return a wealth of practical benefits to our country and to men everywhere. By the same token, we cannot allow our international standing in science and technology to slip to second place. In the eyes of the world, space achievements have come to symbolize over-all national progress and potential.

These are among the chief reasons why we are marshalling our resources to gain first place in manned exploration of space and why we are determined to meet its challenges.

Through Project Mercury, we will learn how man can withstand prolonged weightlessness, how well he can control a spacecraft, and how he can supplement from his own observations the data reported by the automatic sensing devices attached to his body and installed in the spacecraft.

Project Apollo, as an advanced manned space flight program, will capitalize on the pioneering results of Project Mercury and will have three major phases. First, the spacecraft will be launched into orbit about the earth, where for periods of up to two weeks, it will be employed to train astronauts and will serve as a laboratory where the crew can carry out scientific experiments under conditions of zero gravity and the "hard" vacuum of space, conditions impossible to reproduce on earth.

Next, will come flights deeper and deeper into space, leading to a flight around the moon.

The final phase will consist of the lunar landing itself.

The first Apollo phase of earth-orbital flights will be powered by the early-model Saturn, whose initial stage, as mentioned earlier, was test-flown successfully last month. The next phase -- that of deep-space flights -- will require a far more powerful rocket, a super-Saturn, which we have started developing.

For the Apollo expedition to the moon, two main approaches are being weighed.

In one approach, we will launch into earth orbit a special rocket unit capable of propelling the Apollo craft from this orbit on its 240,000-mile voyage to the moon, and for lowering it to the lunar surface. Later, the spacecraft carrying the lunar exploration team will be fired into the same orbit pattern as the big propulsion unit.

Once the second unit is in the proper orbital flight path, the Apollo pilot will use auxiliary rockets to overtake the main propulsion unit. He will maneuver the spacecraft so that the two units can be brought together and coupled. This is called the "rendezvous technique."

After the Apollo lunar vehicle is thus assembled, it will continue along its flight path or "parking orbit" around the earth. When it reaches the point in the orbit that is calculated as best for take-off toward the moon, the big propulsion unit will be ignited and the Apollo expedition will be on its way.

If this rendezvous and subsequent launching from orbit proves feasible, it can be accomplished with two Saturn boosters. If not, it will be necessary to develop a launch vehicle capable of firing the complete Apollo spacecraft to the moon directly from the surface of the earth.

The rendezvous approach, if practicable, could shorten our Apollo schedule considerably.

For the other approach, requiring more than 12,000,000 pounds of thrust, a giant booster called Nova, would be required to launch the Apollo in a direct ascent to the moon.

Regardless of which technique is selected, what will it be like on the flight to the moon?

Either way, the Apollo spacecraft must be accelerated to 25,000 miles per hour to offset the constant pull of the earth's gravity and continue to proceed toward the moon. This amounts to a velocity about 40 percent greater than that required for orbiting the three-man craft around the earth.

Using the speeds we now plan, the flight to the moon will take two and a half days, during which the crew will be weightless. Everything aboard must be fastened in place. Unless objects are so fastened, they will float free. The men will drink and eat from plastic squeeze bottles. Oxygen will be supplied and carbon dioxide removed. These are only a few examples of the conditions under which the crew will live and work.

Navigation will be a complicated problem. The moon, after all, is a relatively small target, 240,000 miles from earth, and orbiting the earth at a speed of 2,000 miles per hour.

The pull of the earth's gravity will slow Apollo's speed to about 6,500 miles per hour after one day, and to approximately 1,500 after two days.

On the last leg of the moonward course, however, the gravitational force of the moon will be more powerful than that of the earth. The spacecraft will pick up speed as it nears the moon. In the final approach, the pilot will fire a landing rocket and the spacecraft will descend to the surface.

On the first flights, the stay on the moon will be short, perhaps only a few hours. The exploration team will gather soil and rock samples and will check radiation. Photographs will be taken of surface features and of the heavens as viewed from the moon. Various other scientific investigations and measurements will be made.

Perhaps the most difficult part of the space mission will be starting the return flight. When you consider that each of the current launchings from Cape Canaveral involves hundreds of people on the launch pad, in the blockhouse, in the control centers, and indirectly many more at the check-out and tracking facilities -- it becomes clear that a lunar take-off with three men, all inside the spacecraft, will require the utmost in automation. The Apollo spacecraft and its attached lunar take-off rocket will weigh approximately 25 tons.

The homeward trip will take the same length of time as the outward-bound voyage -- two and one half days. The force of earth's gravity will steadily increase until the Apollo craft reaches a speed of 25,000 miles per hour.

The final, critical stage of the mission will be entry into the earth's atmosphere. Air friction will raise the surface temperature of the spacecraft to a peak as high as 5,000 to 6,000 degrees Fahrenheit, more than half as hot as the sun's surface.

The craft will have a moderate amount of controlability, enabling the pilot to land in the general area selected. The spacecraft will be lowered to earth by parachute.

The actions necessary to get a program of such magnitude under way have made the past few months a time of many decisions.

We analyzed the work to be done. We found it included more than 2,000 separate problems. We employed modern computing machines and advanced programming techniques, similar to those used in the Polaris missile program and by the du Pont Company and other firms.

We found that one of the pacing items was construction of launching and test facilities, and have taken the necessary steps to enlarge the Atlantic Missile Range at Cape Canaveral to more than five times its existing size. This is required for the very large boosters for the manned lunar program. This decision resulted from the work of a joint NASA-Air Force survey team.

On September 7, we announced the selection of a

Government-owned ordnance plant near New Orleans, as a fabrication site for large launch vehicle stages. This plant, at Michoud, had been in standby status for several years. Its use will facilitate the employment, through competition, of industrial contractors.

It is available to the deep water transportation necessary for the larger boosters.

We are acquiring substantial acreage in southwest Mississippi near the Michoud plant, to be used for the ground-testing of the boosters to be built there.

We have selected a site in Harris County, Texas, at the edge of Houston, for NASA's new Manned Spacecraft Center.

These decisions provide a four-location complex connected by water transportation. They supplement the major facilities we have at Huntsville, Alabama -- the Marshall Space Flight Center, managed by Dr. Wernher von Braun. In this complex, it will be possible to work most of the year outdoors.

Effective November 1, we completed a reorganization of NASA to provide greater emphasis on our major programs.

The nine NASA field centers now report directly to general management. Four new headquarters program offices have the responsibility for drawing on industry, university, and government resources, as needed, for establishing technical guidelines, for budgeting and programing funds, and for evaluating and reporting progress.

Some of the nation's most experienced and best qualified leaders have come to Washington to work in our space program. These men, and many others in the NASA program, know the technical side of aeronautics and space. They are experienced in the management of large activities.

It is fortunate for this nation that such men are willing to forego large earnings in industry and normal personal and family life to supply the leadership needed in our national space effort.

We are now in the process of recruiting about two thousand additional technically qualified men and women to strengthen our organization so that we can effectively contract out the bulk of the work. Any help you can give us will be much appreciated.

Tonight there is not time to discuss the 58 successful earth satellites and two sun satellites the United States has launched over the past four years, providing great advances in man's knowledge of space, the upper atmosphere and the earth as a planet. Nor is there time to cover our programs of satellite applications in weather forecasting and expanded world communications. Each of these programs is important enough to justify a separate speech.

In addition to these direct applications, the national investment in space research and development has produced new materials, metals, alloys, and compounds that have already gone into commercial production. Your industry has learned to produce liquid oxygen in volume and at low cost, partly because of the demand for its use as a rocket propellant. Liquid oxygen is finding ever wider use in the steel industry to make open hearth furnaces burn hotter and cleaner, and thus to make high-grade steel cheaper. Liquid nitrogen, a by-product of liquid oxygen manufacturing, is used to freeze whole blood for indefinite storage and to produce fresher-tasting orange juice than was obtained from previous freezing processes.

An even newer technology is that of liquid hydrogen, 423 degrees below zero Fahrenheit, more than 100 degrees colder than liquid oxygen. The upper stages of all of our more powerful launch vehicles are based on liquid hydrogen as a fuel -- first of all in the Centaur, which will enter the flight-test phase soon. Just last week, the engine for the Centaur successfully completedfiring tests on the ground. Liquid hydrogen increases rocket engine performance by 30 percent.

In using liquid hydrogen, we are capitalizing on a technology in which America is far advanced, thanks to pioneering research in the Bureau of Standards and technological developments sponsored by the Atomic Energy Commission. We cannot foresee at present what applications the private economy will make of developments such as these.

However, that they will prove of great value in an age of profound scientific and technological change can hardly be doubted.

In carrying out its responsibility, NASA cooperates with and depends upon private industry, universities, and many other government agencies -- not only the Department of Defense, the Atomic Energy Commission, and the Bureau of Standards, but the Weather Bureau, the Federal Communications Commission, the Federal Aviation Agency, the National Science Foundation, and others.

It has been only four years since the first man-made satellite orbited the earth. Since then, progress in this new field of space has been tremendous. I believe that in the years ahead the rate of progress will trace a steeply ascending curve. I believe also that the many problems we will solve to achieve manned exploration of space will create a wealth of new materials, consumer goods, processes, and techniques, thus opening a host of new jobs, careers, opportunities for investment, and a general national growth.

We can be first in space if we advance our scientific and technical knowledge at the most rapid rate possible, and if we go forward with the sustained effort that it requires.

That is the basis of our national space effort.

Thank you very much.

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